**LIGHT AND MOVEMENT**

GLADYS LEE, TANYA CHEE AND YEO YIHUI

Class 113, Nanyang Girls’ High School, 2 Linden Drive, Singapore 288683

**Abstract**

In this project, the relationship between the movement of plants and the different colors of the light they are exposed to was investigated. Similar plants were put into boxes wrapped with differently colored cellophane paper, which were then exposed to light for seven days. The height each plant grew after the seven days was then measured. The experimental results obtained indicated that

**Introduction**

The amount of sunlight a plant receives everyday has been integral to its survival. A plant can grow successfully and flourish if it absorbs enough sunlight to allow photosynthesis to take place. Thus it can be seen that sunlight is indeed important to various plant species if they are to thrive.

While the *amount* of sunlight a plant needs to grow healthily, what about the *color* of the light the plant is exposed to? Does the color of the light affect its growth in any way, whether negative or positive? If mankind discovers what kind of light is the best for plant growth, perhaps in the future we will be able to cultivate rare medicinal plants successfully on an international scale, and therefore help others in need. It is hoped that through this experiment, we will gain more understanding of the integral relationship between plants and light.

The hypothesis is as follows: If the movement (growth) of plants is related to the different colors of light, then sunlight will result in a more significant movement of plants than the other colored lights (it will be taller than the other plants exposed to lights of different colors).

**Materials**

* Colored cellophane paper (yellow and green) – 2 pieces
* Green Bean Seeds – 9 seeds
* Tupperware – 3 containers
* Cotton Wool – 15 pieces
* Cardboard Boxes of Similar Size – 3 pieces
* Measuring Tape – 1 roll

**Methods**

The variables for our investigation are as follows:

* Independent Variable (IV) : Color of the Light
* Dependent Variable (DV) : Height the Plant Gains in Growth During Experiment
* Control Variables (CV) : (1) Environmental conditions

(2) Type of Seeds

**A. Setting up the experiment (includes “planting seeds”):**

1. Wrap the cellophane paper (green or yellow) around the cardboard box.

2. Prepare a Tupperware that contains 5 moist cotton wool and 1 green bean seed.

3. Place the Tupperware into the cardboard box.

4. Poke a few holes all around the cardboard box for ventilation.

**B. Monitoring the growth of the seeds:**

1. Place the entire set-up under

2. The seeds are to be monitored daily for seven days by measuring the height of the seedlings/plants using a ruler.

3. Water the plants with a fixed amount of 100ml regularly to keep the cotton wool moist.

4. Repeat the experiment 3 more times and obtain the average height of the seedlings after seven days.

5. Repeat steps 1-3 with 2 other set-ups but use a different coloured cellophane paper.

Note: One of the cardboard boxes would not need to be wrapped with cellophane paper because the colour of the light to be tested is the colour of sunlight.  

Sunlight Green light



Yellow Light

**C. Analysis of results:**

1. Tabulate the results.

2. Create a table of the colour of the light against the height of the seedlings for each of the 3 set-ups.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Colour of cellophane paper | green (G) yellow(Y) | | | | sunlight (S)  Average  Y S  0.7 0.08 0.9  1.9 0.2 2.3  3 3.3 4.3  4.6 2.0 5.9  4.9 2.8 6.8  7.3 6.7 7.8  11.2 10.6 13.2 | |
|  | 1st trial 2nd trial 3rd trial 1st trial 2nd trial 3rd trial  2.5 0.2 0.2  3.0 0.9 3  5.0 2 6  5.8 3.9 8  6.0 5.5 9  10.0 6.5 7  18.0 11 10.5 | | | | 1st trial 2nd trial 3rd trial G |
| Day1 | 2.0 | 0.1 | 0.1 | 0.01 0.1 0.1 |
| Day2 | 4.0 | 1.0 | 0.8 | 0.1 0.2 0.2 |
| Day3 | 4.5 | 1.5 | 3.0 | 1.5 1 0.8 |
| Day4 | 7.0 | 4.0 | 3.0 | 2.3 2.2 1.6 |
| Day5 | 5.5 | 5.5 | 3.5 | 3.5 3 2 |
| Day6 | 10.0 | 5.8 | 6.0 | 9.0 6 5 |
| Day7 | 16.0 | 9.0 | 8.5 | 15.0 8 9 |

3. Analyse the table and determine the relationship between the colour of the light and the growth of the plants.

From the table, it is observed that the height of the green bean seedlings (growth of the plants) varies with the colour of the light it is exposed to. A possible explanation is that different coloured lights have different wavelengths and plants react differently to different wavelengths, such as increased growth.

**Conclusion**

The results support our hypothesis, which is: If the movement (growth) of plants is related to the different colors of light, then sunlight will result in a more significant movement of plants than the other colored lights (it will be taller than the other plants exposed to lights of different colors). Sunlight encompasses all the colours of a spectrum, while different plants grow well in different colours of light. Therefore, sunlight is the best type of light for the growth of the green bean plants.

While carrying out our investigation, we faced two limitations which likely caused a few of the data to be unreliable. One is the inconsistent temperature fluctuations around the location in which we carried out the experiment; next is each seed grows at a different pace, thus we cannot control how uniform their rate of growth is compared to each individual seedling.

Further studies can be made in the application of different colored light to each species of plant on our beautiful Earth to better assist it in growth, especially endangered plants on the brink of extinction. Should we succeed, then we can help these endangered plant species to flourish on Earth once again and preserve the vast diversity of life on Earth. Through such extensions, it is possible to determine the various adaptations through evolution that plants have for different coloured lights.

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